

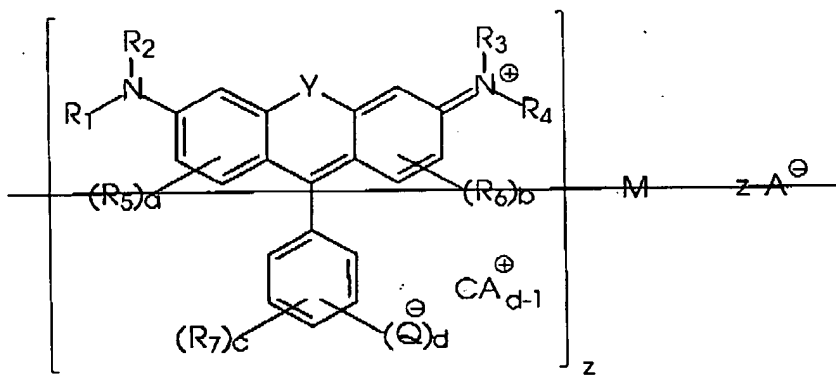
Application No. 10/607,373

**AMENDMENTS TO THE SPECIFICATION:**

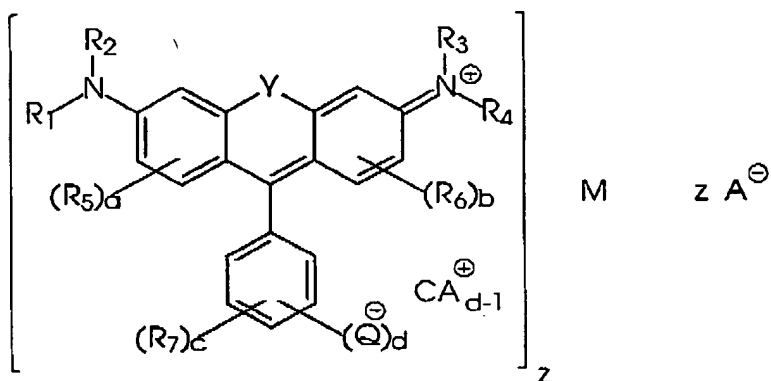
Please replace the amended paragraphs provided below for the indicated pending paragraphs in the specification:

Please replace the following amended paragraph for the pending paragraph at page 9, line 13 to page 13, line 5:

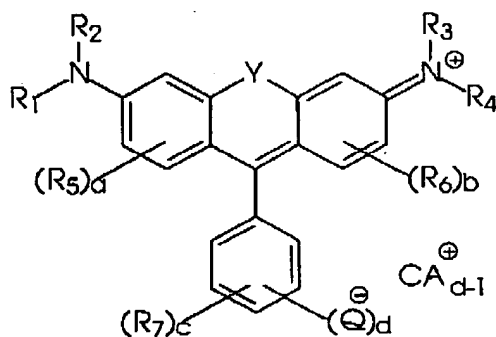
The present invention is directed to colorant compounds. More specifically, the present invention is directed to colorant compounds particularly suitable for use in hot melt or phase change inks. One embodiment of the present invention is directed to compounds of the formula



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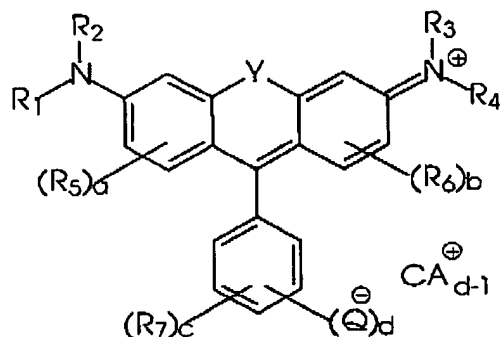


wherein M is either (1) a metal ion having a positive charge of  $+y+0$  wherein  $y+0$  is an integer which is at least 2, said metal ion being capable of forming a compound with at least two

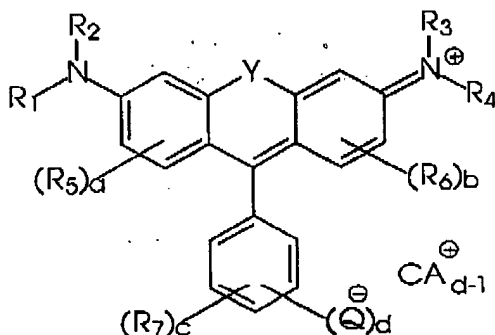


chromogen moieties, or (2) a metal-containing moiety capable of forming a compound with at least two

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chromogen moieties, z is an integer representing the number of



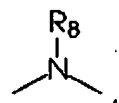
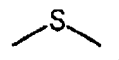
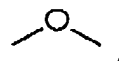
chromogen moieties associated with the metal and is at least 2, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an

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arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, wherein R<sub>1</sub> and R<sub>2</sub> can be joined together to form a ring, wherein R<sub>3</sub> and R<sub>4</sub> can be joined together to form a ring, and wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> can each be joined to a phenyl ring in the central structure, a and b each, independently of the others, is an integer which is 0, 1, 2, or 3, c is an integer which is 0, 1, 2, 3, or 4, each R<sub>5</sub>, R<sub>6</sub>, and R<sub>7</sub>, independently of the others, is (i) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (ii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iii) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, (iv) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl

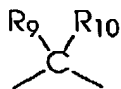
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group can be linear, branched, saturated, unsaturated, and/or cyclic,  
and wherein hetero atoms either may or may not be present in either or  
both of the alkyl portion and the aryl portion of the alkylaryl group. (v) a  
halogen atom, (vi) an ester group, (vii) an amide group, (viii) a sulfone  
group, (ix) an amine group or ammonium group, (x) a nitrile group, (xi) a  
nitro group, (xii) a hydroxy group, (xiii) a cyano group, (xiv) a pyridine or  
pyridinium group, (xv) an ether group, (xvi) an aldehyde group, (xvii) a  
ketone group, (xviii) a carbonyl group, (xix) a thiocarbonyl group, (xx) a  
sulfate group, (xxi) a sulfide group, (xxii) a sulfoxide group, (xxiii) a  
phosphine or phosphonium group, (xxiv) a phosphate group, (xxv) a  
mercapto group, (xxvi) a nitroso group, (xxvii) an acyl group, (xxviii) an  
acid anhydride group, (xxix) an azide group, (xxx) an azo group, (xxxi) a  
cyanato group, (xxxii) an isocyanato group, (xxxiii) a thiocyanato group,  
(xxxiv) an isothiocyanato group, (xxxv) a urethane group, or (xxxvi) a urea  
group, wherein R<sub>5</sub>, R<sub>6</sub>, and R<sub>7</sub> can each be joined to a phenyl ring in the  
central structure,



or

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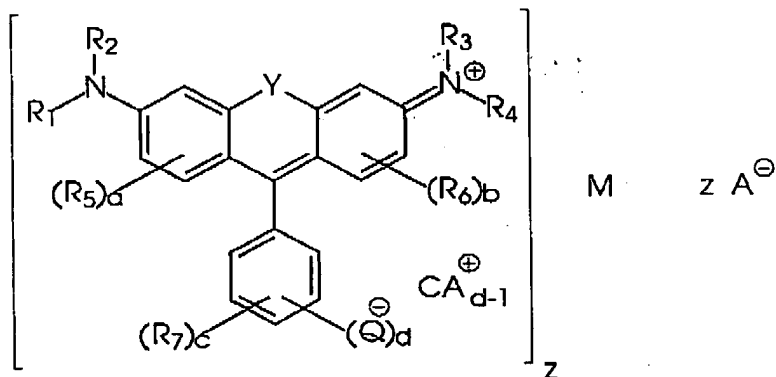
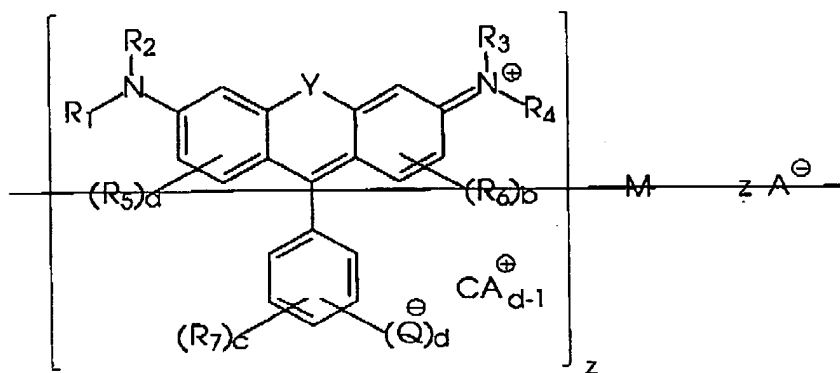


R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub> each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, provided that the number of carbon atoms in R<sub>1</sub>+R<sub>2</sub>+R<sub>3</sub>+R<sub>4</sub>+R<sub>5</sub>+R<sub>6</sub>+R<sub>7</sub>+R<sub>8</sub>+R<sub>9</sub>+R<sub>10</sub> is at least about 16, Q<sup>-</sup> is a COO<sup>-</sup> group or a SO<sub>3</sub><sup>-</sup> group, d is an integer which is 1, 2, 3, 4, or 5. A is an anion, and CA is either a hydrogen atom or a cation associated with all but one of the Q<sup>-</sup> groups.

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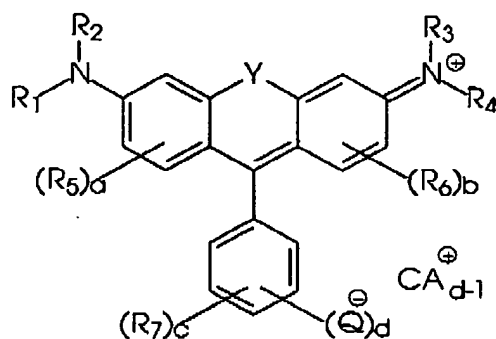
Please replace the following amended paragraph for the pending paragraph at page 33, line 7 to page 36, line 17:

The present invention is directed to compounds of the formula

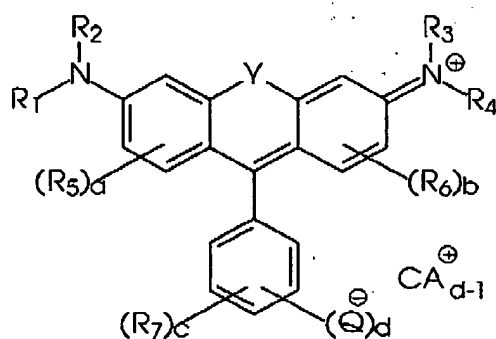


wherein M is either (1) a metal ion having a positive charge of  $+y \pm p$  wherein  $y \pm p$  is an integer which is at least 2, said metal ion being capable of forming a compound with at least two

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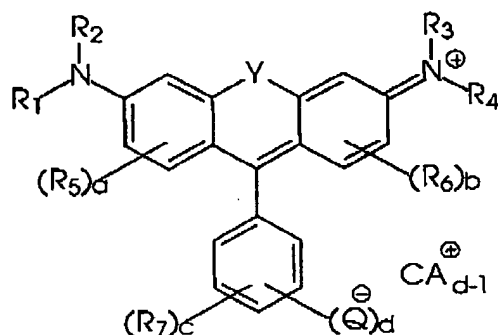
chromogen moieties, or (2) a metal-containing moiety capable of forming a compound with at least two



chromogen moieties, z is an integer representing the number of



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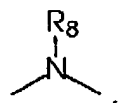
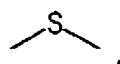
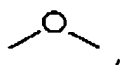
chromogen moieties associated with the metal and is at least 2, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, wherein R<sub>1</sub> and R<sub>2</sub> can be joined together to form a ring,

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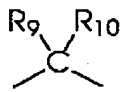
wherein  $R_3$  and  $R_4$  can be joined together to form a ring, and wherein  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  can each be joined to a phenyl ring in the central structure,  $a$  and  $b$  each, independently of the others, is an integer which is 0, 1, 2, or 3,  $c$  is an integer which is 0, 1, 2, 3, or 4, each  $R_5$ ,  $R_6$ , and  $R_7$ , independently of the others, is (i) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (ii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iii) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, (iv) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, (v) a halogen atom, (vi) an ester group, (vii) an amide group, (viii) a sulfone group, (ix) an amine group or ammonium group, (x) a nitrile group, (xi) a nitro group, (xii) a hydroxy group, (xiii) a cyano group, (xiv) a pyridine or pyridinium group, (xv) an ether group, (xvi) an aldehyde group, (xvii) a ketone group, (xviii) a carbonyl group, (xix) a thiocarbonyl group, (xx) a sulfate group, (xxi) a sulfide group, (xxii) a sulfoxide group, (xxiii) a phosphine or phosphonium group, (xxiv) a phosphate group, (xxv) a

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mercapto group, (xxvi) a nitroso group, (xxvii) an acyl group, (xxviii) an acid anhydride group, (xxix) an azide group, (xxx) an azo group, (xxxi) a cyanato group, (xxxii) an isocyanato group, (xxxiii) a thlocyanato group, (xxxiv) an isothiocyanato group, (xxxv) a urethane group, or (xxxvi) a urea group, wherein  $R_5$ ,  $R_6$ , and  $R_7$  can each be joined to a phenyl ring in the central structure,



or



$R_8$ ,  $R_9$ , and  $R_{10}$  each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched,

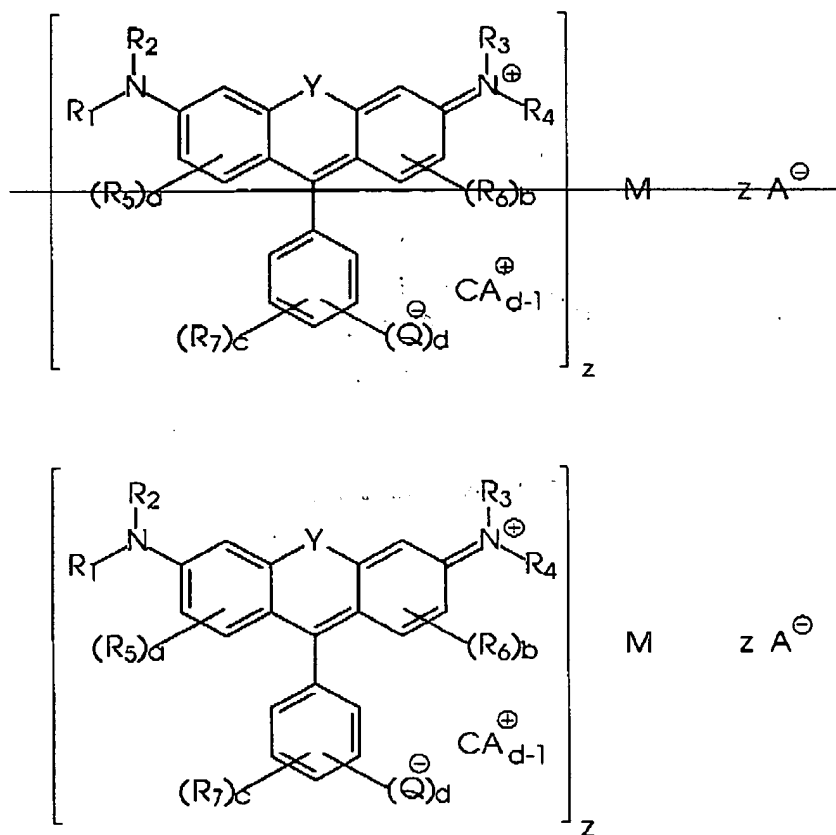
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saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, provided that the number of carbon atoms in  $R_1+R_2+R_3+R_4+R_5+R_6+R_7+R_8+R_9+R_{10}$  is at least about 16, Q is a  $\text{COO}^-$  group or a  $\text{SO}_3^-$  group, d is an integer which is 1, 2, 3, 4, or 5, A is an anion, and CA is either a hydrogen atom or a cation associated with all but one of the Q groups.

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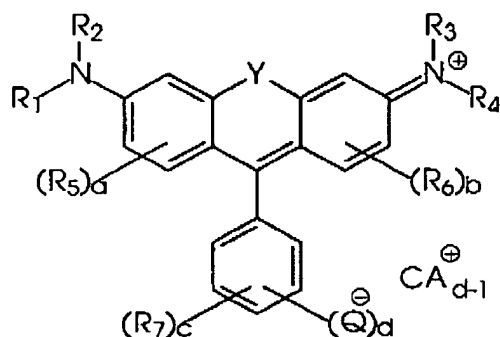
Please replace the following amended paragraph for the pending paragraph at page 36, line 20 to page 38, line 5:

The present invention is directed to compounds of the formula

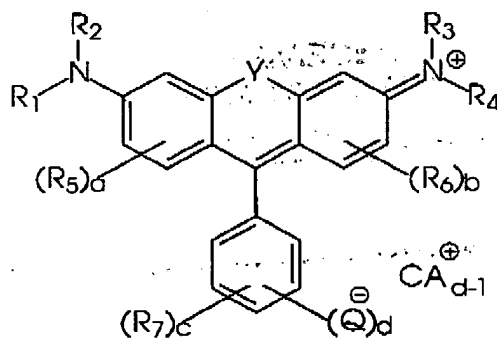


wherein M is either (1) a metal ion having a positive charge of  $+y$  or (2) a metal ion having a positive charge of  $+p$  wherein  $y$  or  $p$  is an integer which is at least 2, said metal ion being capable of forming a compound with at least two

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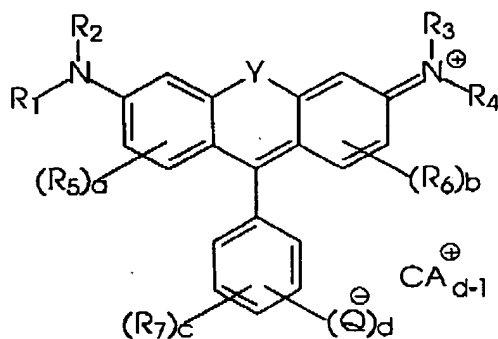


chromogen moieties, or (2) a metal-containing moiety capable of forming a compound with at least two



chromogen moieties, and z is an integer representing the number of

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chromogen moieties associated with the metal and is at least 2. There is no necessary upper limit on the value of z.

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Please replace the following amended paragraph for the pending paragraph at page 38, line 6 to page 39, line 3:

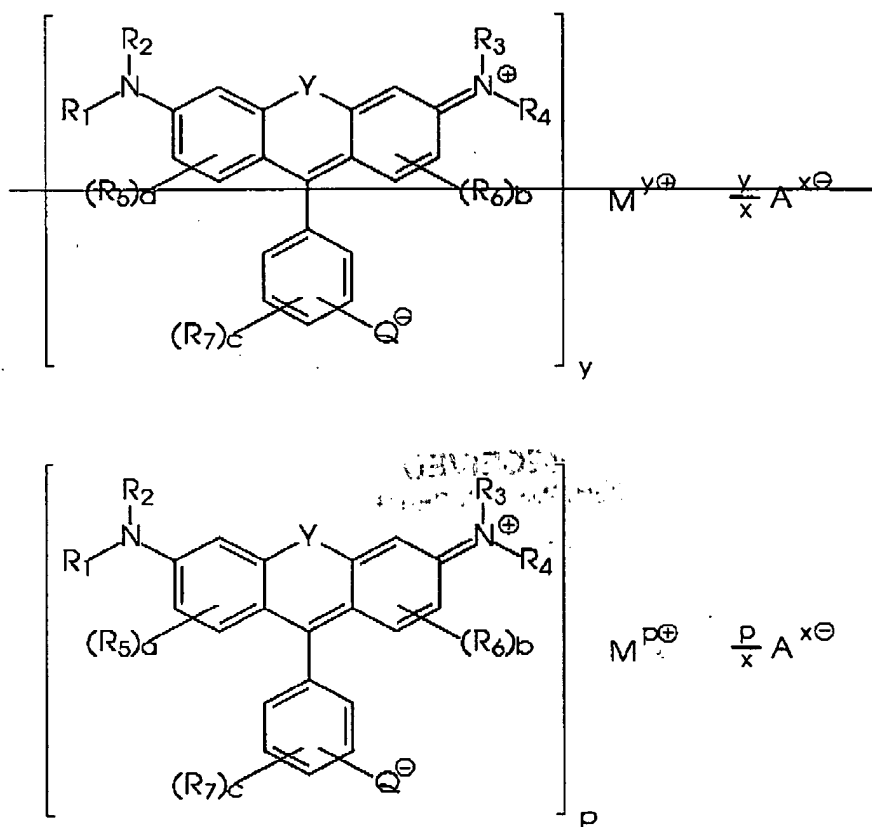
Examples of metal cations having a positive charge of  $+y+p$  wherein  $y$  is an integer which is at least 2 include +2, +3, +4, and higher cations of magnesium, calcium, strontium, barium, radium, aluminum, gallium, germanium, indium, tin, antimony, tellurium, thallium, lead, bismuth, polonium, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, zirconium, niobium, molybdenum, technetium, ruthenium, rhodium, palladium, silver, cadmium, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, mercury, metals of the lanthanide series, such as europium and the like, metals of the actinide series, and the like.



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Please replace the following amended paragraph for the pending paragraph at page 80, line 5 to page 81, line 4:

In one specific embodiment, the compounds of the present invention are of the general formula

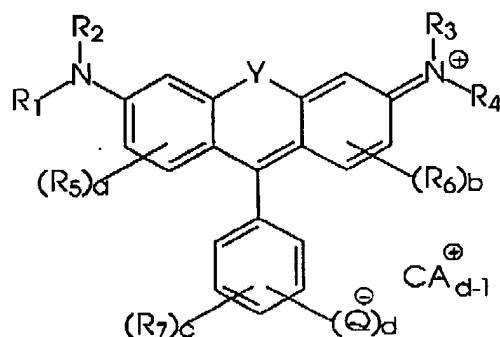


wherein M is a metal cation,  $y$  is an integer representing the charge on the metal cation and is at least 2, A is an anion, and x is an integer representing the charge on the anion.

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Please replace the following amended paragraph for the pending paragraph at page 120, line 11 to page 123, line 2:

Another embodiment of the present invention is directed to a compound comprising the reaction product of (a) a chromogen of the formula



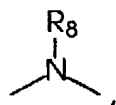
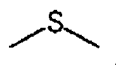
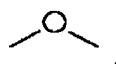
wherein  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v)

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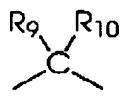
an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, wherein R<sub>1</sub> and R<sub>2</sub> can be joined together to form a ring, wherein R<sub>3</sub> and R<sub>4</sub> can be joined together to form a ring, and wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> can each be joined to a phenyl ring in the central structure, a and b each, independently of the others, is an integer which is 0, 1, 2, or 3, c is an integer which is 0, 1, 2, 3, or 4, each R<sub>5</sub>, R<sub>6</sub>, and R<sub>7</sub>, independently of the others, is (i) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero atoms either may or may not be present in the alkyl group, (ii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iii) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, (iv) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, (v) a halogen atom, (vi) an ester group, (vii) an amide group, (viii) a sulfone group, (ix) an amine group or

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ammonium group, (x) a nitrile group, (xi) a nitro group, (xii) a hydroxy group, (xiii) a cyano group, (xiv) a pyridine or pyridinium group, (xv) an ether group, (xvi) an aldehyde group, (xvii) a ketone group, (xviii) a carbonyl group, (xix) a thiocarbonyl group, (xx) a sulfate group, (xxi) a sulfide group, (xxii) a sulfoxide group, (xxiii) a phosphine or phosphonium group, (xxiv) a phosphate group, (xxv) a mercapto group, (xxvi) a nitroso group, (xxvii) an acyl group, (xxviii) an acid anhydride group, (xxix) an azide group, (xxx) an azo group, (xxxi) a cyanato group, (xxxii) an isocyanato group, (xxxiii) a thiocyanato group, (xxxiv) an isothiocyanato group, (xxxv) a urethane group, or (xxxvi) a urea group, wherein  $R_5$ ,  $R_6$ , and  $R_7$  can each be joined to a phenyl ring in the central structure,



or

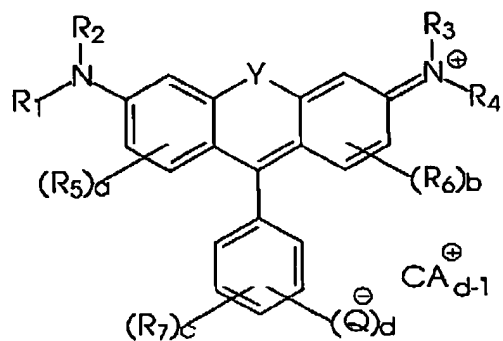


$R_8$ ,  $R_9$ , and  $R_{10}$  each, independently of the others, is (i) a hydrogen atom, (ii) an alkyl group, including linear, branched, saturated, unsaturated, cyclic, substituted, and unsubstituted alkyl groups, and wherein hetero

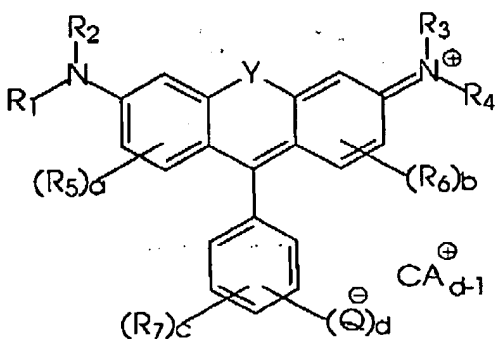
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atoms either may or may not be present in the alkyl group, (iii) an aryl group, including unsubstituted and substituted aryl groups, and wherein hetero atoms either may or may not be present in the aryl group, (iv) an arylalkyl group, including unsubstituted and substituted arylalkyl groups, wherein the alkyl portion of the arylalkyl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the arylalkyl group, or (v) an alkylaryl group, including unsubstituted and substituted alkylaryl groups, wherein the alkyl portion of the alkylaryl group can be linear, branched, saturated, unsaturated, and/or cyclic, and wherein hetero atoms either may or may not be present in either or both of the alkyl portion and the aryl portion of the alkylaryl group, provided that the number of carbon atoms in  $R_1+R_2+R_3+R_4+R_5+R_6+R_7+R_8+R_9+R_{10}$  is at least about 16,  $Q^-$  is a  $COO^-$  group or a  $SO_3^-$  group,  $d$  is an integer which is 1, 2, 3, 4, or 5,  $A$  is an anion, and  $CA$  is either a hydrogen atom or a cation associated with all but one of the  $Q^-$  groups, and (b) a metal salt of which the metal portion is either (1) a metal ion having a positive charge of  $+y-p$  wherein  $y-p$  is an integer which is at least 2, said metal ion being capable of forming a compound with at least two

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moieties, or (2) a metal-containing moiety capable of forming a compound with at least two



moieties.